therefrom that the permeability number has a maximum at a temperature of about 20° C. and a minimum at a temperature of about 75° C. At a temperature in a range of from 25° to 40° C. in which operating temperatures of technical apparatuses normally lie the temperature dependence shows a relatively steep slope. Even if one tries to actively stabilize the temperature of the rings **45** in this range by means of a temperature-adjusting unit, inevitable temperature variations nevertheless result in changes in the permeability number of the rings **45**. According to the invention, the temperature of the rings **45** is thus adjusted to a nominal temperature which is in a temperature range in which there are only small temperature-dependent variations in the permeability number and which is preferably at an extremum of the temperature dependency of the permeability number, i.e., either to a temperature of about 20° or a temperature of about 75°.

[**0037**] To this end, a temperature-adjusting unit **49** schematically shown in **FIG. 2** is provided. It comprises plural windings **51** of a conduit **53** through which a liquid flows, for example, water. The liquid flows through the conduit **53** in a closed circuit **55** which passes through a heating/cooling unit **57** in which the liquid flowing through the conduit **53** is brought to a temperature which is adjustable by a controller **61**. The windings **51** of the conduit **53** abut with a heat contact **59** against a beam tube **63** which forms part of a vacuum chamber of the particle optics **11**.

[**0038**] The beam deflector **25** is disposed within the beam tube **63** in the region in which the windings **51** are wound around the outside of the beam tube **63**. This allows a heat exchange between the beam tube **63** and the deflector **25** to take place by thermal radiation transfer. By adjusting the temperature of the medium flowing through the windings **51** by means of the heating/cooling unit **57**, it is thus possible to adjust the temperature of the ferrite rings **45** of the beam deflector **25** in a range about the nominal temperature. This adjustment is effected through a feed-back control which comprises a sensor **65** fixed to the stack of rings **43, 45** and read out by the controller **61**. Accordingly, the controller **61** can compare an actual temperature of the rings **43, 45** with the nominal temperature thereof and accordingly influence the temperature of the medium in the windings **51** via the cooling/heating unit **57**.

[**0039**] In the temperature-adjusting unit shown in **FIG. 2**, the ferrite rings **45** are adjusted to a nominal temperature of 20° C., since at this temperature the material used for the rings **45** shows a maximum of the permeability number (see **FIG. 4**). As an alternative thereto, it is possible to select as the nominal temperature a value about 75° C. at which the permeability number of the material used for the rings **45** has a minimum. It is evident from **FIG. 4** that at this temperature the extremum (minimum) has a considerably flatter shape than the extremum (maximum) at the temperature of 20° C. The permeability number can thus be held more accurately around the extremum at the nominal temperature of 75° C. than at the nominal temperature of 20° C. On the other hand, at the minimum at the higher temperature of 75° C., the value of the permeability number is considerably lower than at the maximum at 20° C., so that the magnetic effect of the ferrite rings **45** is correspondingly reduced at this temperature.

[**0040**] The beam deflector **25** further comprises sector electrodes **67** which are disposed radially within the rings **43, 45**. They provide an additional electric deflecting field for the beam traversing the deflector **25**, which deflecting field is superimposed with the magnetic field provided by the beam conductors **47**. Accordingly, the deflectors **25, 27** can be operated as a Wien filter, and deflection angles β provided by the deflectors **25, 27** can thus be adjusted with additional degrees of freedom. In particular, the magnetic fields and the electric fields provided for the deflection can be adjusted such that substantially the same deflection angles β result for both the primary electrons and the secondary electrons.

[**0041**] The beam conductors **47** are energized such that the magnetic flux in the ferrite rings **45** is well below a saturation value, such that changes in the magnetic field have a substantially linear dependency from variations of an energizing current. For example, a maximum flux induced in the ferrite rings **45** may be below 25% of a saturation flux therein, or in particular below 15% or even below 10%. Further, the energizing current may be an AC current such that an orientation of the magnetic flux carried by the ferrite rings changes from time to time or periodically.

[**0042**] A variant of the embodiment described with reference to FIGS. **1** to **4** will now be described. Components which correspond in function or structure to components of FIGS. **1** to **4** are designated by the same reference numbers, however, supplemented by an additional letter for the purpose of distinction. Reference is made to the entire above description.

[**0043**] **FIG. 5** schematically shows a lithography system **71** used for transferring a pattern stored in a memory **73** of a controller **29***a* onto a particle-sensitive layer or resist with which a surface **3***a* of a semiconductor wafer **5***a* is coated in a lithography process for manufacturing miniaturized semiconductor structures.

[**0044**] The transfer of the pattern is effected by means of a writing electron beam **33***a*. It is generated by an electron source **35***a* which comprises a cathode plate **75** which has a tip **77** embossed therein. The tip **77** is disposed opposite to a bore of an aperture stop **39***a* which is biased in respect of the cathode plate **75** as anode. Furthermore, the tip **77** is disposed on an optical axis **17***a* of the lithography system **71** and is illuminated from above by a laser beam **78** generated by a semiconductor laser **79** and collimated by a collimating lens **81** into the tip **77**. By controlling the laser **79** via the controller **29***a*, it is possible to rapidly switch the laser beam **78** on and off. The laser beam **78** supports a photon-assisted field emission in the region of the tip **77**, as a result of which electrons are extracted from the tip **77** and accelerated through the aperture stop **39***a* to form the writing electron beam **33***a* which, after having passed through the aperture stop **39***a*, passes through a collimating lens **37***a* .

[**0045**] The collimating lens **37***a* further forms the writing electron beam **33***a* to a substantially parallel beam travelling along the optical axis **17***a*. This beam successively passes through two deflectors **25***a* and **27***a* concentrically disposed in respect of the optical axis **17***a* and then enters an objective **19***a* which finely focuses the same on the semiconductor surface **3***a* or object plane of the lithography system **71**. The structure of the deflectors **25***a* and **27***a* is similar to that of the beam deflectors described with reference to **FIGS. 2 and 3**. Furthermore, a coil **83** likewise controlled by the controller **29***a* is disposed within the objective lens **19***a*, which